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Indian Standard

METHOD FOR DETERMINATION OF TOTAL SOLIDS CONTENT IN CONDENSED MILK

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

METHOD FOR DETERMINATION OF TOTAL SOLIDS CONTENT IN CONDENSED MILK

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Indian Standard

METHOD FOR DETERMINATION OF TOTAL SOLIDS CONTENT IN CONDENSED MILK

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 February 1986, after the draft finalized by the Dairy Products Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Total solids content in condensed milk, an important characteristic, as required to be determined regularly with a view to ascertaining conformity of condensed milk to relevant specifications. This standard has been formulated with a view to provide a uniform method of analysis and to facilitate the interpretation of results.

0.3 This standard is based on ISO/DIS 6734 'Sweetened condensed milk--Determination of total solids content (reference method)' issued by the International Organization for Standardization.

0.4 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2 - 1960*.

1. SCOPE

1.1 This standard specifies a reference method for the determination of the total solids content of condensed milk.

2. QUALITY OF REAGENTS

2.1 Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS : 1070 - 1977†) shall be used when the use of water as a reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the result of analysis.

*Rules for rounding off numerical values (*revised*).

†Specification for water for general laboratory use (*second revision*).

3. TERMINOLOGY

3.1 For the purpose of this standard, the total solids content shall be the mass remaining after completion of heating process specified in this standard. It is expressed as a percent by mass.

4. PRINCIPLE

4.1 Evaporating the water from a test portion in the presence of sand at a temperature of 102°C in a drying oven.

5. APPARATUS

5.1 Desiccator — containing an efficient desiccant, such as silica gel.

5.2 Drying Oven — well-ventilated, capable of being thermostatically controlled at 102 ± 1°C throughout the total working space.

5.3 Flat Bottom Dishes — of depth 20 to 25 mm, diameter 50 to 75 mm, and of appropriate material (for example, stainless steel, nickel or aluminium), provided with well-fitting, readily removable lids.

5.4 Boiling Water-Bath

5.5 Water Bath — capable of being controlled at 30° to 40°C.

5.6 Short Glass Stirring Rods — flattened at one end and fitting into the dish (**5.3**).

5.7 Quartz Sand or Sea Sand — Which passes through a woven wire cloth sieve of nominal aperture size 500 μm IS sieve and is retained on a sieve of nominal aperture size 180 μm IS sieve [*see* IS : 460 (Part 1)-1978*] and which passes the suitability test size as given in **5.7.1** and **5.7.2.**

5.7.1 Place approximately 20 g of sand in a dish containing a stirring rod. Heat the open dish and sand, stirring rod and lid in the oven (**5.2**) controlled at 102 ± 1°C, for at least 2 hours or preferably overnight. Fit the lid, allow the dish to cool in the desiccator (**5.1**) to the temperature of the balance room and weigh to the nearest 0·1 mg.

5.7.2 Moisten the sand with approximately 5 ml of water, mix the sand and water using the stirring rod and heat the dish and sand, stirring rod and lid in the oven (**5.2**), controlled at 102 ± 1°C, for at least 4 hours. Fit the lid, allow the dish to cool in the desiccator (**5.1**) to the temperature of the balance room and weigh again to the nearest 0.1 mg. The difference between the two weighings shall not exceed 0.5 mg.

*Specification for test sieves : Part 1 Wire cloth test sieves (*second revision*).

5.7.3 If the requirement given in 5.7.2 is not met, the sand may be made suitable for the determination as follows.

5.7.3.1 Leave the sand immersed in 25 percent (m/m) hydrochloric acid solution for 3 days. Stir occasionally. Decant off the supernatant liquid as far as possible. Then wash the sand with water until the acid reaction has disappeared. Calcine the sand at 550°C for at least 4 hours using a muffle furnace. Repeat the test for the suitability of the sand as described above.

6. PREPARATION OF THE TEST SAMPLE

6.1 Open the container and thoroughly mix the condensed milk with a spoon or spatula. Use an up and down rotary movement in such a way that the top layers and the contents of the lower corners are moved and mixed.

6.2 Take care to incorporate in the sample any condensed milk adhering to the wall and ends of the container. Transfer the condensed milk as completely as possible to a second container (provided with an air-tight lid). Close the container. If necessary, heat the unopened can in the water bath (5.5) controlled at 30 to 40°C. Open, scrape out all the condensed milk adhering to the interior of the can, transfer to a sufficiently large dish to permit thorough stirring, and mix until the whole mass is homogeneous.

7. PROCEDURE

7.1 **Preparation of the Dish** — Heat a dish (5.3) containing approximately 25 g of sand (5.7) with its lid alongside and a stirring rod (5.6) on top of the lid, in the drying oven (5.2), controlled at 102±1°C for 1 hour. Place the lid (with the stirring rod on top) on the dish, immediately transfer the dish to the desiccator (5.1), allow to cool for at least 45 minutes, and weigh the dish with lid and rod to the nearest 0·1 mg.

7.2 **Test Portion** — Tilt the sand to one side of the prepared dish, place on the clear space about 2.0 g of the prepared test sample, replace the lid with the stirring rod on top and weigh the dish to the nearest 0·1 mg.

7.3 **Determination**

7.3.1 Add 5 ml of water to the test portion in the dish and mix with the stirring rod. Thoroughly mix together the diluted test portion and the sand, and spread the mixture evenly over the bottom of the dish. Leave the stirring end of the rod in the mixture with the other end resting on the rim of the dish.

7.3.2 Heat the dish on the boiling water-bath (5.4), with as much as possible of the bottom of the dish exposed to steam, for approximately 30 minutes stirring the mixture frequently in the early stages of drying so that the mixture is well aerated and becomes crumbly.

7.3.3 Lay the stirring rod flat inside the dish, dry the bottom of the dish and heat the dish, with its lid alongside, in the drying oven (5.2) controlled at 102 ± 1°C, for 4 hours.

7.3.4 Place the lid on the dish, allow the dish to cool in the desiccator (5.1) and weigh to the nearest 0·1 mg.

7.3.5 Repeat the operations described in 7.3.3 and 7.3.4 (heating the dish for 1 hour) until the difference in mass between two consecutive weighings does not exceed 0·5 mg. Record the lowest mass.

8. EXPRESSION OF RESULTS

8.1 Calculation — The total solids content percentage by mass

$$= \frac{M_2 - M_0}{M_1 - M_0} \times 100$$

where

M_0 = mass in grams of the dish, lid and stirring rod (*see* 7.1);

M_1 = mass in grams of the dish, lid, stirring rod and test portion (*see* 7.2); and

M_2 = mass in grams of the dish, lid, stirring rod and dried test portion (*see* 7.3.5).

8.2 Repeatability — The difference between two single results found on identical test material by one analyst using the same apparatus within a short time interval shall not exceed 0·10 g of total solids per 100 g of product.

8.3 Reproducibility — The difference between two single and independent results found by two operators working in different laboratories on identical test material shall not exceed 0·20 g of total solids per 100 g of product.

9. TEST REPORT

9.1 The test report shall show the method used and the result obtained. It shall also mention any operating conditions not specified in this standard, or regarded as optional, as well as any circumstances that may have influenced the result. The test report shall include all details required for the complete identification of the sample.

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2